What is claimed is:

1. A broadband spectroscopic ellipsometer for evaluating a sample comprising:

a light generator that generates a beam of polychromatic light having a range of wavelengths and a known polarization for interacting with the sample;

a compensator disposed in the path of the light beam to induce phase retardations of a polarization state of the light beam wherein the range of wavelengths and the compensator are selected such that at least a first effective phase retardation value is induced that is within a primary range of effective retardations of substantially 135° to 225°, and at least a second effective phase retardation value is induced that is outside of said primary range;

said compensator being rotatable about an axis substantially parallel to the propagation direction of the light beam;

an analyzer that interacts with the light beam after the light beam interacts with the sample; and

a detector that measures the intensity of the light after the interaction with the analyzer as a function of wavelength and of a rotation angle of the compensator about said axis, including light intensities of those wavelengths corresponding to said first and second effective phase retardation values, wherein said intensities correspond to the polarization state of the light impinging on the analyzer.

2. The broadband spectroscopic ellipsometer of claim 1, wherein the first effective phase retardation is defined as either an actual phase retardation within the range of 135° to 225° or a 360° multiple thereof, where the 360° multiple is defined as a range of (135° + n360°) to (225° + n360°) where n is any integer.

3. The broadband spectroscopic ellipsometer of claim 1, further comprising:

a processor that determines the polarization state of the light, after the interaction with the analyzer, from the intensities measured by the detector.

4. The broadband spectroscopic ellipsometer of claim 3, wherein said detector measures the intensities of the wavelengths in said range of wavelengths simultaneously.

5. The broadband spectroscopic ellipsometer of claim 4, wherein said light generator comprises:

a light source that generates a beam of polychromatic light; and

a polarizer that polarizes the light beam before the light beam interacts with the sample.

6. The broadband spectroscopic ellipsometer of claim 4, wherein the range of wavelengths and the compensator are selected to induce a range of effective phase retardations that exceeds 180°.

7. The broadband spectroscopic ellipsometer of claim 4, wherein the range of wavelengths and the compensator are selected to induce a range of effective phase retardations that is substantially centered around an effective phase retardation value of 180°.

8. The broadband spectroscopic ellipsometer of claim 4, wherein the polarizer and the analyzer are linear polarizers.

9. The broadband spectroscopic ellipsometer of claim 4, wherein the detector comprises:

a dispersing element that angularly disperses the beam after interacting with the analyzer as a function of wavelength to a photo detector array.

10. The broadband spectroscopic ellipsometer of claim 9, wherein the dispersing element is one of a diffraction grating, a holographic plate and a prism.

11. The broadband spectroscopic ellipsometer of claim 10, wherein the compensator comprises:

a pair of plates of optically anisotropic material having fast axes that are orthogonal to each other.

12. The broadband spectroscopic ellipsometer of claim 11, wherein the anisotropic material is optically active and said pair of plates have handednesses that are opposite to each other.

13. The broadband spectroscopic ellipsometer of claim 3, further comprising:

a lens that focuses the beam onto the sample to create a spread of angles of incidence, wherein the detector measures intensities of light after the interaction with the analyzer both as a function of wavelength and as a function of angle of incidence.

14. The broadband spectroscopic ellipsometer of claim 13, wherein said detector measures the intensities of the wavelengths in said range of wavelengths simultaneously.

15. The broadband spectroscopic ellipsometer of claim 14, wherein the range of wavelengths and the compensator are selected to induce a range of effective phase retardations that exceeds 180°.

16. The broadband spectroscopic ellipsometer of claim 14, wherein the range of wavelengths and the compensator are selected to induce a range of effective phase retardations that is substantially centered around an effective phase retardation value of 180°.

17. The broadband spectroscopic ellipsometer of claim 14, wherein the polarizer and the analyzer are linear polarizers.

18. The broadband spectroscopic ellipsometer of claim 14, wherein the detector includes:

dispersing element that angularly disperses the beam transmitted by the analyzer as a function of wavelength in one axis, and as a function of radial position within the beam in an orthogonal axis to the one axis to a two-dimensional photo detector array.

19. The broadband spectroscopic ellipsometer of claim 18, wherein the dispersing element includes at least one of a planar diffraction grating, a curved diffraction grating, a holographic plate, a prism, and a lens.

20. The broadband spectroscopic ellipsometer of claim 19, wherein the detector further includes a filter having a shaped aperture that passes only a portion of the beam to the dispersing element.

21. The broadband spectroscopic ellipsometer of claim 14, wherein the compensator comprises:

a pair of plates of optically anisotropic material having fast axes that are orthogonal to each other.

22. The broadband spectroscopic ellipsometer of claim 21, wherein the anisotropic material is optically active and said pair of plates have handednesses that are opposite to each other.

23. The broadband spectroscopic ellipsometer of claim 3, further comprising:

a lens that focuses the beam onto the sample to create a spread of angles of incidence; and

a filter that transmits at least a portion of the beam passing through a pair of opposed radial quadrants and blocks at least a portion of the beam passing through the remaining pair of radial quadrants disposed orthogonally thereto.

24. The broadband spectroscopic ellipsometer of claim 23, wherein said detector measures the intensities of the wavelengths in said range of wavelengths simultaneously.

25. The broadband spectroscopic ellipsometer of claim 24, wherein the range of wavelengths and the compensator are selected to induce a range of effective phase retardations that exceeds 180°.

26. The broadband spectroscopic ellipsometer of claim 24, wherein the range of wavelengths and the compensator are selected to induce a range of effective phase retardations that is substantially centered around an effective phase retardation value of 180°.

27. The broadband spectroscopic ellipsometer of claim 24, wherein the polarizer and the analyzer are linear polarizers.

28. The broadband spectroscopic ellipsometer of claim 24, wherein:

the detector includes a dispersing element that angularly disperses the beam transmitted by the analyzer as a function of wavelength.

29. The broadband spectroscopic ellipsometer of claim 28, wherein the dispersing element includes at least one of a planar diffraction grating, a curved diffraction grating, a holographic plate, a prism, and a lens.

30. The broadband spectroscopic ellipsometer of claim 29, wherein the compensator comprises:

a pair of plates of optically anisotropic material having fast axes that are orthogonal to each other.

31. The broadband spectroscopic ellipsometer of claim 30, wherein the anisotropic material is optically active and said pair of plates have handednesses that are opposite to each other.

32. A method of analyzing a sample comprising the steps of:

generating a beam of polychromatic light having a range of wavelengths and a known polarization for interacting with the sample;

inducing phase retardations of a polarization state of the light beam with a compensator by selecting the range of wavelengths and the compensator such that at least a first effective phase retardation value is induced that is within a primary range of effective phase retardations of substantially 135° to 225°, and at least a second effective phase retardation value is induced that is outside of said primary range;

rotating the compensator about an axis substantially parallel to the propagation direction of the light beam;

subjecting the light beam to interaction with an analyzer after the beam interacts with the sample;

measuring the intensity of the light after interaction with the analyzer as a function of wavelength and of a rotation angle of the compensator about said axis, including light intensities of those wavelengths corresponding to said first and second effective phase retardation values, wherein said intensities correspond to the polarization state of the light impinging on the analyzer.

33. The method of claim 32 wherein the first effective phase retardation is defined as either an actual phase retardation in the range of 135° to 225° or a 360° multiple thereof, where the 360° multiple is defined as a range of (135° + n360°) to (225° + n360°) where n is any integer.

34. The method of claim 32 further comprising the step of:

processing the measured light intensities to determine the polarization state of the light after the interaction with the analyzer.

35. The method of claim 34 wherein the measuring step includes measuring the wavelengths in said range of wavelengths simultaneously.

36. The method of claim 35 wherein the generating step includes:

generating a beam of polychromatic light; and

polarizing the light beam before the light beam interacts with the sample.

37. The method of claim 35 wherein the selecting step further includes selecting the range of wavelengths and the compensator to induce a range of effective phase retardations that exceeds 180°.

38. The method of claim 35 wherein the selecting step further includes selecting the range of wavelengths and the compensator to induce a range of effective phase retardations that is substantially centered around an effective phase retardation value of 180°.

39. The method of claim 35 wherein the polarizing step and the transmitting step are performed using linear polarizers.

40. The method of claim 35 wherein the measuring step includes the step of:

angularly dispersing the transmitted beam as a function of wavelength to an array of photo detector elements.

41. The method of claim 40 wherein the dispersing step includes using a dispersing element that is at least one of a planar diffraction grating, a curved diffraction grating, a holographic plate, a prism, and a lens.

42. The method of claim 34 further comprising the steps of:

focusing the beam onto the sample to create a spread of angles of incidence;

collimating light reflected by the sample; and

the measuring step comprising measuring the intensities of the light transmitted by the analyzer both as a function of wavelength and as a function of angle of incidence.

43. The method of claim 42 wherein the measuring step includes measuring the wavelengths in said range of wavelengths simultaneously.

44. The method of claim 43 wherein the selecting step further includes selecting the range of wavelengths and the compensator to induce a range of effective phase retardations that exceeds 180°.

45. The method of claim 43 wherein the selecting step further includes selecting the range of wavelengths and the compensator to induce a range of effective phase retardations that is substantially centered around an effective phase retardation value of 180°.

46. The method of claim 43 wherein the polarizing step and the transmitting step are performed using linear polarizers.

47. The method of claim 43 wherein the measuring steps include the step of:

angularly dispersing the transmitted beam as a function of wavelength in one axis, and as a function of radial position within the beam in an orthogonal axis, to a two dimensional array of photo detector elements.

48. The method of claim 47 wherein the dispersing step includes using at least one of a planar diffraction grating, a curved diffraction grating, a holographic plate, a prism, and a lens.

49. The method of claim 43 wherein the measuring step includes placing a filter into the beam having a shaped aperture that passes only a portion of the beam before the angularly dispersing step.

50. The method of claim 34 further comprising the steps of:

focusing the beam onto the sample to create a spread of angles of incidence;

collimating light reflected by the sample; and

filtering the beam after interacting with the sample with a quad filter that transmits at least a portion of the beam passing through a pair of opposed radial quadrants and blocks at least a portion of the beam passing through the remaining pair of radial quadrants disposed orthogonally thereto.

51. The method of claim 50 wherein the measuring step includes measuring the wavelengths in said range of wavelengths simultaneously.

52. The method of claim 51 wherein the selecting step further includes selecting the range of wavelengths and the compensator to induce a range of effective phase retardations that exceeds 180°.

53. The method of claim 51 wherein the selecting step further includes selecting the range of wavelengths and the compensator to induce a range of effective phase retardations that is substantially centered around a phase retardation value of 180°.

54. The method of claim 51 wherein the polarizing step and the transmitting step are performed using linear polarizers.

55. The method of claim 51 wherein the measuring steps include the step of:

angularly dispersing the transmitted beam as a function of wavelength to an array of photo detector elements.

56. The method of claim 55 wherein the dispersing step includes using at least one of a planar diffraction grating, a curved diffraction grating, a holographic plate, a prism, and a lens.